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AUTHOR Horowitz, Peter; Otto, David
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ABSTRACT

In 1969, the University of Alberta General Faculties Council created a Committee to Investigate Teaching. One of the projects undertaken by this committee was designing an alternative teaching facility. Three objectives were sought: a) to provide the maximum amount of versatility in intramural design and manipulation, b) to equip it with more visual and tactual stimulants than are normally found in conventional classrooms, and c) to study the effect of a loungelike classroom on teaching and learning. An experimental classroom was designed and compared to a conventional one to see which fostered more learning. Two sections of an English course were used for the experiment, both taught by the same instructor, with identical syllabus, assignments, term papers, and final examination. No significant differences were found in grades earned by the students in these two groups. The instructor reported, however, that participation, disagreement with the instructor, and openess to criticism by peers were more in evidence in the experimental class than in the controlled one. (JA)

THE TEACHING EFFECTIVENESS OF AN ALTERNATIVE TEACHING FACILITY

Peter Horowitz and David Otto

"To an inceasingly greater extent we find ourselves being arranged by impersonal environments in lecture halls, airports, waiting rooms, and lobbies....The straight-row arrangement of most classrooms has been taken for granted for too long. The typical long narrow shape of a classroom resulted from a desire to get light across the room. The front of each room was determined by window location, since pupils had to be seated so that window light came over the left shoulder. However, new developments in lighting acoustics, ventilation, and fireproofing have rendered invalid many of the arguments for the boxlike room with straight rows." (Sommer, 1967, p. 151)

INTRODUCTION

Many colleges and universities have sought to overcome the rigidity of the 'straight-row' classroom in some of their teaching modules, but few have taken the trouble to see if these new teaching facilities have had any effect on the learning of students.

In 1969, the University of Alberta General Faculties Council created a Committee to Investigate Teaching. This committee addressed itself to all facets of teaching, from physical models to pedagogical techniques. One of the projects undertaken by this committee was designing of an alternative teaching facility.[1]

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1. A debt of gratitude goes to the creative work of Mrs. Iris Whaley and Dr. R. W. F. Wilcocks in designing this facility.

Three objectives were sought: first, to provide the maximum amount of versatility in intramural design and manipulation; second, to equip it with more visual and tactual stimulants than are normally found in conventional classrooms; and third, to study the effect of a lounge-type classroom on teaching and learning.

Maximum internal flexibility was achieved in the following manner. Seats were portable half-hexagonal boxes which, when stood on edge, could serve as either small work benches or waist-high partitions. Movable panels were suspended from an ellipitical bar on the ceiling. These panels could be strung out the full length of the ellipse, forming an egg shaped "womb", or could be compressed into a few feet, leaving the room open. Each panel could rotate 360 degrees, and could be held in place by means of a locked set of casters. Four banks of electrically charged rails housed incandescent pin lights. Each bank was controlled by a dimmer switch. Each pin light fixture could be (1) pointed at any locus on a half-sphere, (2) dismounted and moved to another electrical bank in the room, or (3) turned off. Each could hold a color filter.

One could use these three elements, (seats, walls and lights), to create whatever kind of learning site was desired. For example, a class could begin with all students in a single campfire type circle in the center of the room. When the need for buzz-groups arose, smaller groups could move to the corners, and

the panels could function as screens. Or the class may sit on one side of the room and view presentations by students on the other side, where half-hexagonal boxes could serve as a work area and the panels as backdrops.

The Committee's second objective was to rekindle the learner's sensory awareness. Color and light were its first concern. Color was everywhere: the ceiling was midnight blue; the pin lights had red, blue, green and yellow filters; the carpet was dark green; the boxes were covered with orange and dark green carpet. Only the walls were left white. Natural sunlight entered the room either through the clear window pane or through translucent plexiglass sections in the wall panels. Because the pin lights were directional and operated by dimmer switches, certain areas of the room could be flooded with light while other areas obscured by shadow. Other optical stimuli were present in the plexiglass, plywood and fiberboard patterns in the panels. Tactile sensory input was provided by carpet on the floor and on the box-like seats.

Varying geometric forms were available. Squares existed in the 4' X 4' panel inserts. Seats were half-hexagonal. These accompanied the usual retangular outlines found in most conventional classrooms. The panels' pseudo-wall structure removed the starkness of the right-angle corners. This elliptical shape developed a group seating which encouraged more eye contact among students while still maintaining Hall's (1966) Social

Distance.

A room such as this represents the antithesis of the Essentialist philosophy of education. There are no uncushioned, straight back, wooden chairs; no controlled, structured surroundings and no "bare necessities" which are the hallmarks of the Essentialists' frame of mind (See Wingo, 1965). "Sesame Street" has demonstrated that one does not have to indulge in regimentation and strict self-discipline in order to learn. But the question remains-- do people learn more in a congenial environment?

RESEARCH DESIGN

We hypothesized that learning occurs either equally well, or even better in an Alternative Teaching Facility than in the more traditional setting. Learning was operationally defined as the scholastic performance, as evaluated by a competent grader, of two groups of regular undergraduate students at the University of Alberta enrolled in two sections of English 275 (Introduction to Prose). Scholastic performance was measured by the letter grades, A-B-C-D-F, given to the students' two term papers and a number grade (1-9, '9' is excellent) given on the final examination.

These two sections were taught by the same instructor (Horowitz) in two different classrooms: 289 Central Academic Building (the experimental setting) and G-114, Biological

Sciences Building (the controlled setting). Insofar as was humanly possible, the lectures and discussions in both classes were identical. Mr. Horowitz met with both classes at every assigned meeting. The syllabus reading lists, assignments, term paper topics and final examination were identical.

Mrs. Judith Flynn, a Graduate Teaching Assistant in the Department of English, was engaged to grade the papers before Mr. Horowitz read them. She was not informed of the nature of the experiment nor was she given any opportunity to interact personally with the students. Furthermore, she had no idea which students belonged to which section, as the term papers and final examination were collected, when due, into one bundle and delivered to Mrs. Flynn for grading.

A commercial test of general intelligence at the freshman level was administered to the members of both sections during regular class time in the term by Mr. Horowitz.

THE SUBJECTS

As this was a field study, the effect of many variables could not be neutralized. We were able to estimate some of their impact, however.

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1. Henmon-Nelson Tests of Mental Ability, College Level Form A (Revised version) Boston: Houghton Mifflin Company, 1959

Results from the Hanmon-Nelson test indicate that the two groups of students had essentially the same level of ability. Eighteen of the original 29 students attended class the day the test was administered to the experimental group and 18 of the 32 were in the control class session the day following.

TABLE I

Means and t-test values of the Verbal, Quantitative and Total scores of the Two Groups of Students (N = 18 each) on the Hanmon-Nelson Tests of Mental Ability, College Level.

Variable	Exper'l	Control	T Value
Verbal	40.78	38.22	-0.88
Quantitative	21.72	22.39	0.35
Total	62.50	60.61	-0.54

(Maximum scores: Verbal, 60; Quantitative, 40; Total, 100)

F Test differences of variances between these groups.

Variable	Exper'l	Control	F Value
Verbal	32.30	118.07	3.655*
Quantitative	34.09	29.66	1.149
Total	50.03	160.02	3.199**

* $p < .01$ ** $p < .025$

The control group had a much wider range of "intelligence", as measured by this test. Overall, the average score on the verbal portion of the test was lower than that of the experimental group but slightly higher on the quantitative portion. The t-test failed to display any significant differences

in the verbal or quantitative recall of these two groups. One can conclude that the experimental group did slightly better in the verbal area because it had a much smaller variance about the mean than did the control group.

The schools and colleges represented by these two groups of students were unmatched. More students were from the faculty of Arts and the school of Dental Hygiene in the experimental group, while more students from the faculties of Agriculture, Business & Commerce, Engineering, Pharmacy, Physical Education and Science were in the control group. The bias, therefore, seems to lean towards the experimental group, as many more Arts students were enrolled in the experimental group.

The initial male-female registration figures, Table II, showed a distinct partiality towards the experimental group.

TABLE II

A 2 X 2 Chi-Square Matrix of Males and Females

	MALES	FEMALES	TOTAL
Exper'l	8	21	29
Control	19	11	30
TOTAL	27	32	59

$x^2 = 7.59$ df = 1 $p < .01$

The high number of females in the experimental group suggested a better grade achieving performance from that group. Carter, 1952; Edmiston, 1943; Maney, 1933; and Schmuck, 1965 have all demonstrated that female students, ceteris paribus, received higher grades than male students.

There was no significant difference in the class standing (Freshman, Sophomore, etc.) of the two groups as only one individual in each group was beyond Freshman standing. In terms of age, no differences were noted. The average age of each section was eighteen.

The control group had the preferred time of day (Tuesdays and Thursdays from 11:00 to 12:30), while the experimental group met at 8:00, Mondays, Wednesdays, and Fridays. The room used by the control group was somewhat less desirable than even a typically traditional classroom in that it had no windows, a fairly low ceiling and a propensity for echo. (Frye & Standhardt, 1961, would choose to disagree with the last statement).

A survey of these intervening variables indicated that the members of the experimental group would have had a slight advantage over their counterparts in the control group.

RESULTS

As table III clearly shows, there was no difference between the grades received by the Experimental and Control Groups for the two term papers and final examination.

TABLE III.

Chi-Square Comparisons of the Grades Given the Two Groups of Students Registered in Two Sections of English 275

FIRST TERM PAPER

GRADE	EXPERIMENTAL GROUP	CONTROL GROUP	TOTAL
A	2	1	3
B	9	11	20
C	10	10	20
D	5	5	10
F	0	1	1
TOTAL	26	28	54

$x^2 = 1.46$ df = 4 $p < .80$

SECOND TERM PAPER

GRADE	EXPERIMENT GROUP	CONTROL GROUP	TOTAL
A	1	2	3
B	7	7	14
C	11	10	21
D	3	3	6
F	0	1	1
TOTAL	22	23	45

$x^2 = 1.36$ df = 4 $p < .85$

TABLE III (CONTINUED)

FINAL EXAMINATION

GRADE	EXPERIMENTAL GROUP	CONTROL GROUP	TOTAL
9	0	1	1
8	4	4	8
7	8	7	15
6	11	5	16
5	4	3	7
4	0	3	3
3	0	1	1
TOTAL	27	24	51

$x^2 = 7.31$ $df = 6$ $p < .30$

The assumption that this alternative teaching facility is as conducive to learning as is a traditional classroom can be supported, but the premise that the facility is more beneficial to learning (as herein defined) is unsupportable.

DISCUSSION

We do not feel that grades alone reflect all that had occurred in both classrooms. (See Maslow & Mintz, 1956 and Mintz, 1956). A number of differences were noted between the behavior of both sections. As the term wore on, we noticed that attendance was far better in the experimental class in spite of its being held at 8:00 a.m. The students in the experimental group were more ready much earlier in the term to participate in class discussions, and by late October, were actively debating quite

freely among themselves and with the instructor, all of this with little urging from the instructor. Students in the control group, on the other hand, needed prodding throughout the term and were by and large content to sit silently through most classes.

No observable differences existed between the students in either group on the dimension of receptivity to the material presented, but, as an example, half of one class session in the experimental group was devoted to examining the reasons why the class thought the book assigned for that meeting was "utterly boring". Students in the control group no doubt shared the same opinion of the assigned reading, but no one thought to complain.[1]

We noticed more informality and group cohesion in the experimental group than in the control group. More of the students in the experimental group were addressing each other by first names, and this occurred between students registered in different faculties. In contrast, few students appeared to know, or even recognize, their classmates in the control group.

Finally, Horowitz reports that visits during office hours were more numerous from students in the experimental group than from students in the control group, and that during these visits, those from the experimental group seemed more at ease than those

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1. Corroborative testimony, written a year earlier, from a fellow member of the English Department, is appended.

from the control class. During the second term (English 275 was a first term course) several of the students from the experimental section continued to visit the instructor, who never saw anyone from the control group again.

Surpisingly, the cost of furnishing an Alternative Teaching Facility is close to the cost of equipping a traditional lecture room. Room 289, Central Academic Building did cost more than it should, and more than the traditional classroom does, but this difference was chiefly due to miscalculations in planning the pilot project and the need to rewire the light fixtures. A second such teaching facility has been furnished in another building on campus. When the cost of the traditional furniture was deducted from the $2,500 spent for reconversion, the net expense for this second room was approximately $1,000. Here, again, $500 was spend in removing fluorescent fixtures and installing incandescent lamps. It would be safe to estimate that the chief difference in furnishing a room such as 289, Central Academic Building in a building under construction would be the price of a carpet.

RECAPITULATION

An Alternative Teaching Facility was created in order to provide a more stimulating environment for learning. The results of the students' work in the cognitive domain, when measured in terms of the conventional system of grading, showed no noteworthy change. Informal interaction, both between students and between

instructor and student, elements of the affective domain, did, however, increase.

One final comment. Within the last twenty years, psychologists such as Hebb have begun to explore the effects of sensory deprivation on human beings. They have learned that human subjects, when deprived of normal sensation for extended periods of time become bored, restless, mentally lethargic, and have reported an inability to engage in prolonged thought. (See Altman, 1971; Heron, 1957; Hebb, et al., 1954; and Vernon & Hoffman, 1956) In an effort to provide the maximum amount of space per capital budget dollar expended, administrators and architects have continued using rectangular box-like cubicles with bolted down ranks of seats facing front, in an environment of bland monochromaticism, washed in uniform (shadow diffusing) fluorescent illumination, and covered with sterile smooth-surfaced floor tile. (See Bechtel & Srivastaba, 1966; Black, 1950; Cooper & Zubek, 1958; Kyzar, 1971; Maslow & Mintz, 1956; Mintz, 1956; Reichert, 1973; Sommer, 1969; and Wotton, 1970)

We thrust our students into this environment and expect them to learn. In our opinion, creative, productive learning is not compatible with this setting.

BIBLIOGRAPHY

Altma, I. "Ecological Aspects of Interpersonal Functioning" in Esser, A. H. (ed) Behavior and Environment New York: Plenum Press, 1971, pp. 291 - 306.

Argyle, M. & Dean, J. "Eye Contact, Distance, and Affiliation." Sociometry v. 28 (1965) pp. 289 - 304.

Bass, B. M. & Klubeck, S. "Effects of Seating Arrangements on Leaderless Group Discussions." Journal of Abnormal and Social Psychology v. 47 (1952) pp. 724 - 727.

Bechtel, R & Srivastaba, R. "Human Movement and Architectural Environment." Milieu v. 2 (1966) pp. 7 - 8.

Bevelas, A. "Communication Patterns in Task-Oriented Groups." Journal of the Acoustical Society of America v. 22 (1950) pp. 725 - 730.

Black, J. W. "The Effect of Room Characteristics upon Vocal Intensity and Rate." Journal of the Acoustical Society of America v. 22 (1950) pp. 174 - 176.

Brodey, W. "Sound and Space" Journal of the American Institute of Architects v. 42 (1964) pp. 58 - 60.

Carter, R. S. "How Invalid are Marks Assigned by Teachers?" Journal of Educational Psychology v. 43 (1952) pp. 218 - 228.

Cooper, R. M. & Zubek, J. P. "Effects of Enriched and Restricted Early Environments on the Learning Ability of Bright and Dull Rats" Canadian Journal of Psychology v. 12 (1958) pp. 159 - 164.

Edmiston, R. W. "Do Teachers Show Partiality Toward Boys or Girls?" Peabody Journal of Education v. 20 (1943) pp. 234 - 238.

Filipe, N. "Interpersonal Distance and Small Group Interaction" Cornell Journal of Social Relations v. 1 (1966) pp. 59 - 64.

Frye, R & Standhardt, F "See More-Hear More-Learn More in Windowless Rooms" Educational Screen and Audio-Visual Guide v. 40 (1961) pp. 274 - 277.

Hall, E. T. The Hidden Dimension New York: Doubleday & Co., Inc., 1966.

Hare, A. P. & Bales, R. F. "Seating Position and Small Group Interaction" Sociometry v. 24 (1963) pp. 480 - 486.

Harmon, D. B. "Lighting and Child Development" Illuminating Engineering v. 40 (1945) pp. 199 - 228.

Hearn, G. "Leadership and the Spatial Factor in Small Groups" Journal of Abnormal and Social Psychology v. 54 (1957) pp. 269 - 272.

Heron, W. "The Pathology of Boredom" Scientific American v. 196 (1957) pp. 52 - 56.

Horowitz, M. J. "Human Spatial Behavior" American Journal of Psychotherapy v. 19 (1965) pp. 20 - 28.

Horowitz, M. J.; Duff, D. F. & Stratton, L. O. "Body-Buffer Zone" Archives of General Psychiatry v. 11 (1964) pp. 651 - 656.

Howells, L. T. & Becker, S. W. "Seating Arrangment and Leadership Emergence" Journal of Abnormal and Social Psychology v. 64 (1962) pp. 148 - 150.

Kyzar, B. L. "Comparison of Instructional Practices in Classrooms of Different Design. Final Report" Natchitoches, Louisiana: The School Planning Laboratory of Northwestern State College, 1971 (mimeograph). ERIC report # ED 048 669.

Lewis, C. E. "Equipping the Classroom as a Learning and Teaching Laboratory" American Schoolboard Journal v. 90 (1940) p. 29.

Maney, C. E. "Sex Bias in College Marking" Journal of Higher Education v. 4 (1933) pp. 29 - 31.

Maslow, A. H. & Mintz, N. L. "Effects of Esthetic Surroundings: I Initial Effects of Three Esthetic Conditions upon Perceiving 'Energy' and 'Well Being' in Faces" Journal of Psychology v. 41 (1956) pp. 247 - 254.

McBride, G. A General Theory of Social Organization and Behaviour St. Lucia: University of Queensland Press, 1964.

Mintz, N. L. "Effects of Esthetic Surroundings: II. Prolonged and Repeated Experience in a 'Beautiful' and an 'Ugly' Room" Journal of Psychology v. 41 (1956) pp. 459 - 466.

Reichert, J. F. "Why Not Color Your Campus Creatively?" The Chronicle of Higher Education v. 7 (March 19, 1973) p. 12.

Schmuck, R. & Van Egmond, E. "Sex Differences in the Relationship of Interpersonal Perceptions of Academic Performance" Psychology in the Schools. v. 2 (1965) pp. 32 - 40.

Sanders, D. C. "Innovations in Elementary School Classroom Seating" Bureau of Laboratory Schools Publication #10. Austin, Texas: University of Texas, 1958.

Sommer, R. "The Distance for Comfortable Conversation: a Further Study" Sociometry v. 25 (1962) pp. 111 - 116.

Sommer, R. "Leadership and Group Geography" Sociometry v. 24 (1961) pp. 99 - 110.

Sommer, R. Personal Space: the Behavioral Basis of Design Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1969.

Sommer, R. "Small Group Ecology" Psychological Bulletin v. 67 (1967) pp. 145 - 152.

Sommer, R. "Studies in Personal Space" Sociometry v. 22 (1959) pp. 247 - 260.

Sommer, R. & Whitney, G. "Design for Friendship" Canadian Architect v. 6 (1961) pp. 59 - 61.

Steinzor, B. "The Spatial Factor in Face to Face Discussion Groups" Journal of Abnormal and Social Psychology v. 45 (1950) pp. 552 - 555.

Studer, R. & Stea, D. "Architectural Programming, Environmental Design, and Human Behavior" Journal of Social Issues v. 22 (1966) pp. 127 - 136.

Vernon, J. and Hoffman, J. "Effect of Sensory Deprivation on Learning Rate in Human Beings" Science v. 123 (1956) pp. 1074 - 1075.

Wingo, G. M. The Philosophy of American Education New York: D. C. Heath and Company, 1965.

Wotton, E. "Environment and Motivation -- A Close Relationship" Transcript of a Conference held in the Public Archives and National Library Auditorium, October 8th, 1970 (mimeograph).